

REMARKS

Applicant respectfully requests consideration of the subject application. Claims 1 and 7 have been amended. No claims have been canceled and no new claims have been added.

Allowable Subject Matter

Applicants thank the Examiner for pointing out that claims 28-33 would be allowable if rewritten or amended to overcome the rejections under 35 U.S.C. 112, second paragraph.

Claim Rejections – 35 U.S.C. § 112

Claims 1, 2, 8, 9, 18, 24, 25, 35 and 36 have been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Before Applicants amend the claims, Applicants would like to submit the following argument for consideration. Definiteness of the claim language must be analyzed in light of the content of the particular application disclosure. (MPEP § 2173.02). Applicants respectfully submit “determining a layer 2 multicast channel from a layer 3 multicast channel” as required in claim 1 and language in the other claims is definite when analyzed in light of the specification.

The specification discloses in paragraph [0014] that for an embodiment “the host 401 receives notification of a multicast channel (e.g., a multicast IP address).” Similarly, paragraph [0017] discloses that “for example, if the multicast channel is an

IP multicast address, then the network element 411 translates the IP multicast address into an Ethernet MAC address.” Moreover, paragraph [0014] discloses that for an embodiment “if the multicast channel is an IP multicast address, then the host 401 will listen for multicast traffic by translating the IP multicast address to an Ethernet Media Access Control (MAC) address.” Similarly, paragraph [0017] of the specification discloses that according to one embodiment “the network element 411 translates the multicast channel from a higher layer to Ethernet.”

Therefore, Applicants’ respectfully submit that the claim language is definite in light of the specification to one possessing the ordinary skill in the art. Furthermore, one possessing the ordinary skill in the art analyzing the claim language in light of the content of the Applicants’ disclosure would understand that an example of a multicast channel is a multicast IP address but is not limited to a multicast IP address. However, if particular claim language is still perceived as indefinite, Applicants will amend the claim as necessary.

Claim Rejections - 35 U.S.C. §103(a)

Claims 1-10 and 34-37 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Walton et al. “Practical Multicasting on a Nonbroadcast Subnetwork” in view of Araujo et al. (U.S. Pat. 6118785) and in further view of Owens et al. (U.S. Pat. 6977906).

Claims 11 and 12 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Walton et al. in view of Araujo et al. and Owens et al. and in further view of Unitt et al. (U.S. Publication US 2004/0240466A1).

Claims 13-16, 21, and 24-27 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Walton et al. in view of the Applicant's admitted prior art, Araujo et al., and Owens et al.

Claims 17 and 18 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Walton et al. in view of Araujo et al. and Owens et al., and in further view of O'Dell et al. (U.S. Pat. 6891825).

Claims 19 and 20 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Walton et al. in view of Araujo et al., Owens et al., O'Dell et al., and in further view of Unitt et al.

Claims 22 and 23 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Walton et al. in view of the Applicant's admitted prior art, Araujo et al., Owens et al., and in further view of Unitt et al.

Claim 1

Claim 1 requires transmitting multicast traffic for the layer 2 multicast channel as PPPoE multicast traffic in a PPPoE multicast session to the PPPoE client.

Walton describes "a successful implementation of multicasting over a 640 Mbit/s, wormhole-routing LAN." (Walton, Abstract). Walton also describes that the point-to-point mesh physical topology of Myrinet, a wormhole-routing subnetworks, do not have multicast capability as does Ethernet LANs. (Walton, page 251). To implement a multicast capability on a Myrinet subnetwork, Walton describes running a single multicast daemon on on host attached to the Myrinet subnetwork for controlling the multicast circuits on the Myrinet subnetwork and another daemon

process running on each multicast capable host. Moreover, Walton describes mapping IP multicast addresses to Myrinet multicast cycle numbers. (Walton, page 254). Because Walton describes a multicast scheme on a Myrinet subnetwork, which is designed to overcome the inefficiencies of Ethernet and is incompatible with Ethernet, Walton fails to describe transmitting multicast traffic for the layer 2 multicast channel as PPPoE multicast traffic in a PPPoE multicast session to the PPPoE client.

Araujo describes a communication protocol designed for managing the communication between peers that includes a signaling channel in frames formatted according to the communication protocol. The signaling channel is utilized by intermediate devices in the access provider network, such as central office switches or other concentration points in the network to facilitate the management of the flow of data traffic in the access providers network. The signaling channel is identified in the intermediate devices and in the end stations, such as customer premises equipment or remote access servers. (Araujo, Abstract). The signaling channel allows the concentration/multiplexing equipment to become a distributor point for multicast feeds. (Araujo, col. 15, ll. 3-13). Moreover, Araujo describes the PPP packet that includes a signaling channel, enhanced PPP, encapsulated within an HDLC frame, within an L2TP packet, or within an ATM cell using AAL5 adaptation. (Araujo, col. 8, ll. 5-16; col. 10, ll. 28-46). Because Araujo does not describe PPP protocol encapsulated with Ethernet, Araujo fails to describe transmitting multicast traffic for the layer 2 multicast channel as PPPoE multicast traffic in a PPPoE multicast session to the PPPoE client.

Owens describes a computer implemented method for provisioning broadband service in a Point-to-Point Protocol over Ethernet (PPPoE) network. A PPPoE session is established, and a username is randomly chosen from a list of usernames stored on a modem. An authentication request is then transmitted from the modem to a Broadband Remote Access Server (BRAS) over a PPPoE network. The modem receives authorization from at least one of multiple Broadband Service Nodes (BSNs). (Owens, Abstract). Because Owens does not describe a multicast scheme over PPPoE, Owens fails to describe transmitting multicast traffic for the layer 2 multicast channel as PPPoE multicast traffic in a PPPoE multicast session to the PPPoE client.

Therefore the combination of Walton, Araujo, and Owens describes a Myrinet subnetwork providing a wormhole multicasting scheme that involves the multiple forwarding of a single multicast packet amongst several hosts on the same sub-network. (Walton, page 252). A computer on the Myrinet subnetwork is then connected to the Internet through an ADSL modem. The computer and the network are running an enhanced PPP encapsulated within an HDLC frame, within an L2TP packet, or within an ATM cell using AAL5 adaptation according to Araujo so intermediate devices in the central office can facilitate the management of the flow of data traffic in the access providers network. Furthermore, the enhanced PPP allows the concentration/multiplexing equipment to become a distributor point for multicast feeds.

Since the network running enhanced PPP is not a PPPoE network (the PPP is not encapsulated in Ethernet), a secondary PPPoE network is connected to

second computer in the Myrinet subnetwork according to Walton. The second computer and network then use provisioning of the broadband service of the PPPoE network according to Owens, as described above.

Because the combination fails to describe or suggest transmitting multicast traffic for the layer 2 multicast channel as PPPoE multicast traffic in a PPPoE multicast session to the PPPoE client, the combination fails to render claim 1 obvious.

Furthermore, Applicants amended claim 1 to include broader limitations of claim 28 that the Office Action indicated would be allowable of the cited references if amended to overcome the rejections. Amended claim 1 also requires notifying the PPPoE client of a layer 2 multicast channel and encapsulating the multicast traffic with PPPoE that identifies the multicast traffic as a PPPoE multicast session.

Claims 2-6

Applicants respectfully submit that claims 2-6 are dependent directly or indirectly on claim 1, thus include the same limitations as claim 1. As such, claims 2-6 are patentable for at least the same reasons as claim 1.

Claim 7

Claim 7 requires encapsulating the multicast packet with a Point to Point Protocol over Ethernet (PPPoE) encapsulation, indicating the layer 2 multicast channel in the PPPoE encapsulation, and indicating a PPPoE multicast session identifier in the PPPoE encapsulation.

The combination of Walton, Araujo, and Owens, as discussed above, describes a Myrinet subnetwork utilizing a multicast on the Myrinet subnetwork according to Walton that maps IP multicast address to Myrinet multicast cycle numbers. At least one computer on the Myrinet subnetwork is connect to the internet through an ADSL modem where the computer and the ADSL network uses enhanced PPP encapsulated within an HDLC frame, within an L2TP packet, or within an ATM cell using AAL5 adaptation according to Araujo. Moreover, the at least one computer on the Myrinet subnetwork is connect to a Point-to-Point Protocol over Ethernet network that uses a method to provision broadband service over a Point-to-Point Protocol over Ethernet network as described by Owens.

Because the combination fails to describe encapsulating the multicast packet with a Point to Point Protocol over Ethernet (PPPoE) encapsulation, indicating the layer 2 multicast channel in the PPPoE encapsulation, and indicating a PPPoE multicast session identifier in the PPPoE encapsulation; the combination fails to render claim 7 obvious.

Furthermore, Applicants amended claim 7 to include broader limitations of claim 28 that the Office Action indicated would be allowable of the cited references if amended to overcome the rejections. Amended claim 7 also requires decapsulating the PPPoE encapsulated multicast packet when the layer 2 multicast channel is the desired multicast channel.

Claims 8-12

Applicants respectfully submit that claims 8-12 are dependent directly or

indirectly on claim 7, thus include the same limitations as claim 7. As such, claims 8-12 are patentable for at least the same reasons as claim 7.

Claim 34

Claim 34 requires similar limitations as claim 7. Specifically, claim 34 requires encapsulating the multicast packet with a Point to Point Protocol over Ethernet (PPPoE) encapsulation, indicating in the PPPoE encapsulation the layer 2 multicast channel and a PPPoE multicast session identifier, and transmitting the PPPoE encapsulated multicast packet.

Because claim 34 requires similar limitations as claim 7, Applicants respectfully submit claim 34 is allowable for at least the same reasons as claim 7.

Claims 35-37

Applicants respectfully submit that claims 35-37 are dependent directly or indirectly on claim 34, thus include the same limitations as claim 34. As such, claims 35-37 are patentable for at least the same reasons as claim 34.

Claim 13

Claim 13 requires a forwarding engine coupled with the control engine to encapsulate the multicast packet in a PPPoE encapsulation, to indicate the layer 2 multicast channel in the PPPoE encapsulation, to indicate a PPPoE multicast session identifier in the PPPoE encapsulation, and to transmit the PPPoE encapsulated multicast packet.

Paragraph 9 of Applicants' Background of the Invention discloses an access concentrator 111 that generates IP multicast packets for each of the established PPPoE unicast sessions, encapsulates the generated IP multicast packets with PPPoE where each IP multicast packet's PPPoE encapsulation includes an identifier for the corresponding PPPoE unicast sessions and each of the generated IP multicast packets also include an identifier for the unicast Ethernet address of the corresponding one of the hosts 101, 103, and 105. Moreover, the access concentrator can additionally encapsulate the PPPoE encapsulated IP multicast packets with a delivery protocol (e.g., ATM).

The combination of Walton, Araujo, and Owens, as discussed above, in further view of paragraph 9 of Applicants' Background of the Invention describes a Myrinet subnetwork utilizing a multicast on the Myrinet subnetwork according to Walton that maps IP multicast address to Myrinet multicast cycle numbers. At least one computer on the Myrinet subnetwork are connect to the internet through an ADSL modem where the computer and the ADSL network uses enhanced PPP encapsulated within an HDLC frame, within an L2TP packet, or within an ATM cell using AAL5 adaptation according to Araujo. Moreover, at least one computer on the Myrinet subnetwork is connect to a Point-to-Point Protocol over Ethernet network that uses a method to provision broadband service over a Point-to-Point Protocol over Ethernet network as described by Owens. Furthermore the Point-to-Point Protocol over Ethernet network includes an access concentrator 111 that generates IP multicast packets for each of the established PPPoE unicast sessions, encapsulates the generated IP multicast packets with PPPoE where each IP

multicast packet's PPPoE encapsulation includes an identifier for the corresponding PPPoE unicast sessions and each of the generated IP multicast packets also include an identifier for the unicast Ethernet address of the corresponding one of the hosts 101, 103, and 105. Moreover, the access concentrator encapsulates the PPPoE encapsulated IP multicast packets with a delivery protocol (e.g., ATM).

Because the combination fails to describe a forwarding engine coupled with the control engine to encapsulate the multicast packet in a PPPoE encapsulation, to indicate the layer 2 multicast channel in the PPPoE encapsulation, to indicate a PPPoE multicast session identifier in the PPPoE encapsulation, and to transmit the PPPoE encapsulated multicast packet; the combination fails to render claim 13 obvious.

Claims 14-16

Applicants respectfully submit that claims 14-16 are dependent directly or indirectly on claim 13, thus include the same limitations as claim 13. As such, claims 14-16 are patentable for at least the same reasons as claim 13.

Claim 21

Claim 21 requires a network element to decapsulate traffic of the multicast from a first delivery protocol, to encapsulate traffic of the multicast with Point to Point Protocol over Ethernet (PPPoE), to indicate a PPPoE multicast session identifier and the layer 2 channel in the multicast's PPPoE encapsulated traffic, to further

encapsulate the multicast's PPPoE encapsulated traffic with a second delivery protocol, and to transmit the multicast's PPPoE encapsulated traffic.

The combination of Walton, Araujo, Owens and paragraph 9 from Applicants' Background of the Invention, as discussed above, describes mapping IP multicast address to Myrinet multicast cycle numbers but fails to describe a network element to encapsulate traffic of the multicast with Point to Point Protocol over Ethernet (PPPoE), to indicate a PPPoE multicast session identifier and the layer 2 channel in the multicast's PPPoE encapsulated traffic.

Because the combination fails to describe a network element to decapsulate traffic of the multicast from a first delivery protocol, to encapsulate traffic of the multicast with Point to Point Protocol over Ethernet (PPPoE), to indicate a PPPoE multicast session identifier and the layer 2 channel in the multicast's PPPoE encapsulated traffic, to further encapsulate the multicast's PPPoE encapsulated traffic with a second delivery protocol, and to transmit the multicast's PPPoE encapsulated traffic; the combination fails to render claim 21 obvious.

Claims 22-27

Applicants respectfully submit that claims 22-27 are dependent directly or indirectly on claim 21, thus include the same limitations as claim 21. As such, claims 22-27 are patentable for at least the same reasons as claim 21.

Claim 17

Claim 17 requires a Point to Point Protocol over Ethernet (PPPoE) module coupled with the network interface card, the PPPoE module to indicate to the network interface card the layer 2 multicast channel, to receive PPPoE encapsulated multicast traffic on the layer 2 multicast channel from the network interface card, and to decapsulate multicast traffic from PPPoE.

O'Dell describes an approach for providing multi-user access to a packet switched network via a shared Ethernet-based local area network. (O'Dell, Abstract). O'Dell describes user stations connected to a local area network (LAN) using Point-to-Point Protocol (PPP) encapsulated using the Ethernet-based LAN protocol. (O'Dell, Abstract). The packets are then transmitted by a customer premise equipment (CPE) to a digital subscriber line (DSL) access multiplexer that transports the multiple PPP sessions from the users to a multiplexer/demultiplexer, such as an asynchronous transfer mode (ATM) switch. (O'Dell, Abstract). The ATM switch transports the multiple PPP sessions over a single permanent virtual circuit and the PPP sessions are terminated at a remote access server that forwards the packets to a backbone router. (O'Dell, Abstract). The backbone router then forwards the packets to a packet switched network. (O'Dell, Abstract).

Therefore, the combination O'Dell with Walton, Araujo, and Owens, all three discussed above, describes a Myrinet subnetwork providing a wormhole multicasting scheme that involves the multiple forwarding of a single multicast packet amongst several hosts on the same sub-network. (Walton, page 252). A computer on the Myrinet subnetwork is then connected to the Internet through an ADSL modem. The computer and the network connecting the computer to the Internet are running an

enhanced PPP encapsulated within an HDLC frame, within an L2TP packet, or within an ATM cell using AAL5 adaptation according to Araujo so intermediate devices in the central office can facilitate the management of the flow of data traffic in the access providers network. Furthermore, the enhanced PPP allows the concentration/multiplexing equipment to become a distributor point for multicast feeds.

Since the network running enhanced PPP is not a PPPoE network (the PPP is not encapsulated in Ethernet), a secondary PPPoE network is connected to second computer in the Myrinet subnetwork according to Walton. The second computer and network then use provisioning of the broadband service of the PPPoE network according to Owens, as described above.

Since the Myrinet subnetwork of Walton is a different LAN standard designed to overcome the inefficiencies of Ethernet, the Myrinet subnetwork of Walton is incompatible with the Ethernet LAN of O'Dell. Therefore, a separate network of computers is needed to form an Ethernet-based LAN connected to a packet switched network according to O'Dell.

Because the combination fails to describe a the control engine to encapsulate the multicast packet in a PPPoE encapsulation, to indicate the layer 2 multicast channel in the PPPoE encapsulation, to indicate a PPPoE multicast session identifier in the PPPoE encapsulation, and to transmit the PPPoE encapsulated multicast packet, the combination fails to render claim 17 obvious.

Claims 18-20

Applicants respectfully submit that claims 18-20 are dependent directly or indirectly on claim 17, thus include the same limitations as claim 17. As such, claims 18-20 are patentable for at least the same reasons as claim 17.

Conclusion

If the allowance of these claims could be facilitated by a telephone conference, the Examiner is invited to contact the undersigned at (408) 720-8300. If there are any additional charges, please charge our Deposit Account No. 02-2666.

Respectfully submitted,

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